DOCUMENT RESUME

ED 373 748 IR 016 758

AUTHOR Price, Robert V.; And Others
TITLE Producing Effective Graduate-Level Distance Education Courses for Interactive Television.
PUB DATE 94
NOTE 25p.; In: Proceedings of Selected Research and Development Presentations at the 1994 National Convention of the Association for Educational Communications and Technology Sponsored by the Research and Theory Division (16th, Nashville, TN, February 16-20, 1994); see IR 016 784.
PUB TYPE Reports - Evaluative/Feasibility (142) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Delivery Systems; *Distance Education; Educational Planning; *Educational Technology; *Educational Television; Feedback; Graduate Study; Higher Education; Information Transfer; Instructional Design; Instructional Effectiveness; *Interactive Television; Student Motivation; Teacher Attitudes; Teacher Education; *Teaching Methods; *Technological Advancement; Telecourses; Training

ABSTRACT

Distance-education delivery through interactive television (ITV) is an effective means of providing instruction to learners. There are many advantages, such as the ability to provide immediate feedback and personal participation. To be effective, however, ITV requires structured planning and development, making the use of instructional design principles imperative. The following recommendations are made for training teachers about ITV: (1) provide an overview of the technology and how it works; (2) provide hands-on guided practice; (3) incorporate effective elements of instruction; (4) conduct periodic follow-up inservice training; (5) train with teachers who volunteer; (6) establish the amount of time needed to prepare and teach ITV courses; (7) provide experiences with other faculty members; (8) incorporate strategies for adding visual components to audio courses; and (9) use strategies that encourage group cohesion and student motivation. Teachers must adapt instruction to meet the varied needs of students, as both teachers and students adjust to the demands of the medium. (SLD)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED 373 748

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Title:

Producing Effective Graduate-Level Distance Education Courses for Interactive Television

Authors:

Robert V. Price, Ph.D.
Judi Repman, Ph.D.
David White, M.Ed.

Texas Tech University
College of Education, Box 41071
Lubbock, TX 79409

IR016758

BEST COPY AVAILABLE

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

S. Zenor

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Technology has changed the way we view education and the delivery of instruction. Distance education is no exception when it comes to technology advancements and change. Distance education (DE) is described as an alternative delivery of instruction (Relaford, 1988); instruction that is delivered by a method other than through the traditional classroom setting. It can be defined as "formal instruction in which a majority of the teaching function occurs while educator and learner are at a distance from one another" (Verduin & Clark, 1991, p. 19). "Distance learning refers to the use of telecommunications (audio and video) to bring people together for the purpose of learning" (Brownell, 1992, p. 510).

Technology advancement has allowed DE delivery systems to provide students needed instructional opportunities that would otherwise pass them by (Barker, 1992). There are several types of DE delivery systems that promote distance learning (see appendix A). They include telephone audioconferencing, computer-based messaging, audiographic conferencing, interactive television, satellite broadcast, and others (Clark, 1989). Each of these systems involves specific technology that allows for the transfer of educational information. This information provides the learner with instructional elements that are necessary to help learning occur.

Research indicates that these systems are effective in producing learning. Each has advantages and disadvantages when used to deliver instruction. Our focus here is to examine the use of interactive television as the DE instructional delivery medium. A review of research and related literature on distance education delivered primarily through interactive television will help determine what practices in course design produce effective DE, what conditions of learning are associated with effective DE courses and what learner characteristics are most important in designing effective DE programs.

Interactive Television Effectiveness

Interactive television technology as a DE delivery system involves two-way communication between an originating classroom and remote classroom sites. Wilson (1991) states that such systems "provide immediate feedback and participation in interactive instructional processes through the use of alternative electronic communications."(p. 27) Video and audio signals are transmitted to and from the originating and remote sites via paths such as telephone lines, microwave systems, and satellite. This telecommunication technology provides enhanced DE instructional delivery because learners from every site can see and interact with the instructor during classroom meetings and instructional presentations. According to Moore and McLaughlin (1992) courses offered by such a system at the St. Cloud State University indicate that "students achieve at about the same rate and level as do students in on-campus sites. As a matter of fact, students at remote locations tend to do a bit better on their class examinations."(p. 75) Robinson (cited in Moore & Thompson et al, 1990) presented results from a five year study of the two-way Carroll Instructional Television Consortium. Data indicated that "student achievement levels are comparable to those found in live classrooms."(p. 68) Morehouse, Hoaglund & Schmidt et al (cited in Relaford, 1988) presented results on the effectiveness of interactive television from an analysis of the Minnesota system that indicated:

"Instructional television students enjoyed learning and achieved at a level similar to students in traditional classes. There was no evidence of statistically significant differences in achievement and/or in the rate of learning."(p. 27)

This and other research findings indicate that two-way interactive television is an effective delivery system for promoting learning. Other factors also influence the learning experience resulting from the use of two-way interactive television.

Interactive Television Advantages

According to Alaska University (1989a) instructional television offers many potential advantages, including visual imagery, motion, motivation/Interest, persuasion, illustration of major points, summarization of key concepts, presenting otherwise unavailable experts or resources and others. It is particularly effective in delivering primary content and is most effective when combined with interactive activities.(p. 4)

Hudspeth & Brey (cited in Relaford, 1988) suggest that interactive two-way audio and video classes provide the best alternative to the traditional classroom and that they have these advantages:

* It provides a means to bring master teachers, upper level courses and graduate courses to smaller colleges.

* It is an excellent tool for providing choices.

* It is a means for providing enrichment and advanced offerings to students.

Barker (1990) includes these advantages for two-way interactive instruction:

* Two-way full-motion video is possible between all sites; students can see the teacher as well as other students at different sites, and the teacher can see all students at all sites.

* Most systems presently in operation are small networks that promote local control of the teacher and curriculum and maintain an overall class size.

* Open-line microphones allow for full teacher- student and student-to-student audio interaction. That is students can interact audibly not only with the teacher but also with students at other sites.

These advantages help interactive television, as an DE delivery medium, to be effective in aiding the learning process. However, learning occurs because information has been transmitted to and from the learner so that new knowledge is acquired. Because the information transferred to and from the student is important to the learning process, DE courses require the implementation of instructional design principles (Moore et al, 1990; Texas Education Agency, 1987) to insure proper course design and planning and a successful teaching/learning experience. DE instructional planning is complex and involves expertise in designing, planning and delivering of course materials, and evaluating the DE course so that appropriate changes can be made to improve future course delivery.

Instructional Design in Distance Education

The effectiveness of DE instructional delivery will depend upon the planning of the instructional materials and activities to be used in the delivery. The use of a systematic instructional design (ID) process will assure that the delivered instruction will be effective and successful in promoting learning. This systematic process of planning instruction will aid the educator or instructional designer in planning and developing such activities and instructional materials.

Dick and Carey (cited in Gagne, Briggs & Wager, 1988) describe an ID model that includes nine stages:

(1) identify instructional goals;
(2) conduct an instructional analysis;
(3) identify entry behaviors and learner characteristics;
(4) write performance objectives;
(5) develop criterion-referenced test items;
(6) develop an instructional strategy;
(7) develop and select instructional materials;
(8) design and conduct a formative evaluation with possible need for revision; and
(9) design and conduct a summative evaluation.

The Alaska University (1989b) suggests a four step ID model that includes design, development, evaluation and revision. The design stage includes:

* Determining the need for instruction.
* Analyzing the intended audience.
* Establishing instructional goals.

The development stage includes:

* Deriving specific objectives for goals.
* Creating a content outline.
* Reviewing existing materials.
* Organizing content.
* The selecting and developing of materials and methods.

The evaluation stage includes:

* Reviewing goals and objectives.
* Developing an evaluation strategy.
* Collecting and evaluating data.
* Determining recommended revisions based on the data analysis.

And finally, the revision stage allows for the development and implementation of a revised instructional plan.

Heinich, Molenda, and Russell (cited in Moller, 1991) provide the ASSURE model for planning programs that utilize DE technologies. It is primarily used by the individual instructor for planning daily classroom use of media. The ASSURE model has six steps:

1 - Analyze Learners
2 - State Objectives
3 - Select Media and Materials
4 - Utilize Materials
5 - Require Learner Performance
6 - Evaluate and Revise

Haynes and Dillon (1992) apply an instructional system design (ISD) model adapted from Gagne and Briggs that can help design instruction consisting of several interrelated activities. These include:

(1) the analysis of learner characteristics,
(2) the determination of instructional objectives,
(3) the selection of strategies,
(4) the design of media,
(5) the implementation of instruction, and
(6) the evaluation of the outcomes linked to the specific objectives and strategies.

ID models represent the framework that is used to guide the entire process of designing instructional systems (Heinich, Molenda, and Russell, 1989). Each of the ID models included here can aid in providing the framework necessary to plan effective instruction and activities. There are many other ID models. Appendix C contains a detailed description of an instructional design model adapted from the ASSURE model.

Environmental Characteristics of Distance Education

An understanding of the characteristics belonging to the distance education environment will aid the design and planning processes. Keegan (1990) cites five characteristics of distance education:

* The quasi-permanent separation of teacher and learner throughout the length of the learning process (this distinguishes it from conventional face-to-face education).

* The influence of an educational organization both in the planning and preparation of learning materials and in the provision of student support services (this distinguishes it from private study and teach-yourself programs).

* The use of technical media - print, audio, video, or computer - to unite teacher and learner and carry out the content of the course.

* The provision of two-way communication so that the student may benefit from or even initiate dialog (this distinguishes it from other uses of technology in education).

* The quasi-permanent absence of the learning group throughout the length of the learning process so that people are usually taught as individuals and not in groups, with the possibility of occasional meetings for both didactic and socialization purposes. (p. 44)

According to the Office of Technology Assessment (1989),

"Students, teachers, course material and presentation, and interaction are all affected; distance learning creates a new context within which the education process and student-teacher interaction take place. Old styles of teaching and learning may not be most appropriate or effective when mediated by telecommunications technologies....In designing distance courses or modules, teachers and instructional designers have had to find ways to restructure interactivity."(p. 93)

The Texas Education Agency (1987) states that "because of the intercession of distance and devices between the teacher and the student, new instructional techniques, varied uses of material and modification of class management may be appropriate."(p. 5)

The consideration of these characteristics during the design and planning stages will help the educator or instructional designer plan for the unique opportunities made available with the DE communication technology being used to deliver instruction.

Course Design and Planning

Design and assessment are key areas where distance educators and educational technologists can influencing how students go about their studies (Morgan, 1991, p. 10). Important considerations should include the delivery system, available resources, course content, the target learner audience, their learning styles, and their ability to engage in the learning process. Instructional experiences can be carefully designed and developed so that they can be used by a wide variety of learners possessing similar learner-related characteristics (Dwyer, 1990). The course planning process can involve many people who are specialists in certain fields. Members of such a planning team might include subject authors, instructional technologists, illustrators, media specialists, librarians, photo-librarians, and editors (Moore and Thompson et al, 1990, p. 4). Brinkley, Pavlechko & Thompson (1991) suggest a design team consisting of the course instructor, an instructional designer, a producer/director, a graphic artist and an on-air director. However, the individual instructor may be the entire planning team and provide the necessary course content that would be edited and published for a DE course. A realistic planning team for a typical distance education course might consist of the instructor, an instructional technologist (instructional designer), and a student or potential student of the course.

Development of course content can begin by representing it in a manner that enables the planning team to develop a "course description, general aims, instructional goals, units and lessons/ modules to drive the content." (Brinkley, Pavlechko & Thompson, 1991, p. 51) Thus, the purpose of the planning team is to structure academic content in a form suitable for study by distant learners (Moore & Thompson et al, 1990). Instructional design principles can be utilized to provide for instructional strategies that fit the medium of delivery.

In regard to planning instruction, Wolcott (1993) cites three studies that indicate that college teachers' majors concerns include: selecting content and course materials, covering the course content, class processes, on-going planning activities, students' participation in class discussions, communicating with students, and recognizing student characteristics.

McGreal (1991) provides a set of guidelines to help the ordinary teacher produce instructional materials designed for distance education systems. They include:

> (1) The materials should be simple so that the teacher and students are clear about the goals of each lesson.
> (2) The materials should be highly structured so that the objectives of the lesson are achieved.
> (3) There should be many reviews of the material taught in previous lessons.
> (4) Evaluations should take place frequently to ensure that sufficient learning is occurring.
> (5) High interest content material should be found which can lower teacher anxiety, stimulate the students participating in the course, and develop a rapport with them.
> (6) The materials must be relevant to the particular needs of the students.
> (7) Extension activities should be made available for students who need more content to aid the learning process.
> (8) This material, although highly structured, must be clearly perceived by the teacher to be non-restrictive to his/her teaching style.
> (9) The material should be activity oriented in order to divert teachers away from lecturing to students and promote active student learning during class sessions.(pp. 8-9)

Parker and Monson (cited in Moore & Thompson et al, 1990) contend that specific techniques should be incorporated into the course development process. The techniques include humanizing, participation, message style and feedback.

"Humanizing refers to the creation of an accepting environment which breaks down the barrier of distance and generates feelings of rapport between teacher and students. Participation deals with the extent of interaction among participants in the interactive situation. Message style refers to ways of enhancing the interest and appeal of a presentation. Planning for short instructional segments, varying tone of voice and volume, and supplementing programs with visual aids maintain the interest and attention of the students. Feedback allows instructors to determine if their presentations were clear and effective. Both verbal and written feedback should be obtained, and can include questionnaires, interviews, or group reports." (p. 21)

Allen and Carl (1988) list seven characteristics necessary for the creation of a successful distance learning program (see Appendix D for more information). This model was adapted from guidelines found in "Guide to Distance Learning as an Alternative Delivery Procedure" published by the Texas Education Agency. The characteristics include:

(1) high standards are established for their teachers and mediators (student site contact persons; also called proctors, monitors, aides, etc.)
(2) consistently train and retrain staff
(3) carefully evaluate teaching sessions and/or the course packages before distribution by telecommunication or other means
(4) ensure that there are provisions for easy communications between students, instructors and proctors
(5) develop rigorous and valid testing programs which provide rapid response times and feedback loops
(6) package the course content
(7) provide ready accessibility to resources such as mediators and ample audiovisuals, print and other media for student use. (Texas Education Agency, 1987, pp. 4-5)

When the elements included here are considered during the design and planning stages, course effectiveness and efficiency will surely benefit. The design and production of course materials requires such considerations to produce effective delivery through DE technology. An example of the development process can be seen in the elements included in Brinkley, Pavlechko & Thompson's (1991) four element team approach. They include:

* Instruction
* Production
* Design
* On-Air Direction

Steps of the approach include:

* A faculty member is contracted to teach using distance education technology.
* A map of course content is given to the instructional designer. The designer will analyze the map and, if necessary, ask the faculty member for clarification.
The designer then gives the map to the production team (the map is an outline representing the content of the course).
* The design/production team members have an understanding of the course content and are prepared to discuss it with the faculty member.
* The design/production team asks the instructor questions about the content of the course (the course map) and the faculty member uses a computer program to plan the first lesson.
* The teacher designs a single lesson plan consisting of five parts and gives it to the instructional designer. The designer will discuss the lesson plan with the faculty member and, if necessary, ask him/her for clarification. The designer then givesthe lesson plan to the production team.

* The design/production team has an understanding of the lesson plan and the teaching styles and strategies the instructor will use for the distance education medium.

* Specific visuals for the first lesson plan are discussed. Specifics such as which slides and videotapes will be used are decided at this meeting with the faculty member, design and production team.

* An on-air script is produce by the producer and given to the on-air director. This step focuses on cues that the director needs when operating the controls that deliver the course to distant sites such as videotapes, slides and graphics.

* The faculty member reviews the media for the single lesson he/she has produced and makes any final changes to the media. The remaining lesson plans are then produced for the course.(pp. 50-54)

Cyrs and Smith (1991) provide design and production steps needed to produce interactive study guides for interactive television courses. Such guides are described as highly organized sets of "student notes, graphics pictures, graphs, charts and activities which are used in conjunction with a telelecture."(p. 37) The primary purpose of such guides is to focus the learner on key concepts associated with instructional content. Such guides allow the learners to concentrate "on the cognitive, analytical and critical thinking skills being demonstrated by the instructor."(ibid.)

Design steps for developing an interactive study guide include:

* Outline the content of one telelecture.

* Select a short instructional segment that can be shown as a word picture (a graphic representation of an idea, concept, data, geometric shapes, clip art, symbols, etc.).

* Identify the main concept and the supporting or sub-concepts (or examples of the concept) to be illustrated.

* Try to visualize the concept and sub-concepts by looking for ways to turn the words into pictures. If you can find clip art or other appropriate graphics use them and show relationships among the elements by using arrows and lines.

* Concepts that cannot be represented with graphic art can be placed in boxes or circles and arrows and lines can be used to indicate the element relationships.

* Leave out some of the key concept words and insert a blank line so that students will have an opportunity to fill in notes as you lecture.

* Proceed to design Word Pictures for all of the instructional segments in the lesson, being careful to indicate the proper sequence for presentation.(p. 38)

Wolcott (1993) describes the planning processes utilized by faculty members who are involved in distance teaching. Results from her study describe term planning, content, and the extended syllabus.

"...Participants (faculty) approached the task by planning at the course or term level. Planning took the form of a time-consuming, front-end activity rather than an on-going one...essentially packaging the course into an extensive syllabus....The faculty focused on selection and sequencing of content. In planning the course, the faculty were concerned with two dependent tasks: 1) defining the content, i.e., determining what to include, and 2) matching content with the time available in which to present it. These two tasks were embedded in the central planning activity, the development of the course syllabus. The faculty made their planning decisions tangible in the form of a course syllabus....The syllabus, in most cases, was far more extensive than the typical one- or two-page handout. Commonly referred to as the "expanded," "enhanced," or "extended" syllabus, these syllabi had as their base the traditional class syllabus that included a course description, course goals, readings and assignments, a topic outline, and grading policies. In addition to these standard items, the syllabi also contained handouts or hard copies of overhead transparencies, study questions, reprinted articles, and even extensive original essays."(pp. 28-29)

Although there are few studies that investigate the planning of distance teaching in higher education, the literature to date provides large amounts of information on the design and development of distance learning courses. Clearly, the designing of any DE course can be a complex, time consuming task. There are many pieces to fit together during the planning process that aid in the development of course production. Other considerations of course development include the specific elements associated with the distance learner.

Conditions of Learning

The preparation of instructional lessons and the delivery of such lessons to the distance learner involves understanding the learner's previously acquired knowledge and learning capabilities. Lessons should be prepared to meet the knowledge levels of the learners and provide the best method to transfer important information to them. Gagne' (cited in Gee, 1990) provides nine events of instruction that should be considered in the instructional delivery process. These events are designed so that each learner's natural cognitive processing is followed and new knowledge is acquired. Lesson material should be designed for the learners who are to participate in the instructional setting. Appendix C includes the nine events of instruction in detail. In targeting the adult learner, Knowles's (cited in Wilson, 1991) andragogical model makes the followir , assumptions:

* Adults' self-concept moves from one of dependent personality to self-directed human being.

* Adults accumulate a growing reservoir of experience that becomes a rich source of learning.

* Readiness to learn becomes increasingly oriented to their developmental tasks of their social roles.

* Shift in immediate application as their orientation of learning shifts from subject centeredness to performance centeredness.(p. 42)

Wilson (1991) concludes that students learn when all of the above conditions are considered plus the following conditions which are more specific to Distance Education:

* Self-pacing is allowed;
* Feedback is in the "fastest turn-around time that is feasible";
* Interaction with the institution is friendly and nonthreatening;
* Curriculum is structured to guide the student in linking instruction with previous knowledge and interests; and
* They are self-motivated.(p. 42)

The transfer of instruction via interactive television should be done in a manner that is effective and efficient in providing for the learners' needs. It should utilize all available resources to achieve this goal. The use of teaching methods can aid in the learning process. The message that is intended for the learner is transferred through this medium. Heinich, Molenda & Russell (1989) include eight methods to deliver the instructional message. They are presentation, demonstration, drill-and practice, tutorial, gaming, simulation, discovery, and problem solving. Joyce and Weil (1986) provide a variety of teaching models for delivering instruction. Determining which model or method is best used for instruction, depends on the learners involved and the content of the lesson. Information concerning learner characteristics and learning styles is important in planning and delivering instruction when using such methods.

Learner Characteristics and Learning Styles

The distance learner perceives and assimilates information delivered through the DE system. How that information is perceived, depends upon lesson content and structure, content delivery, and the learners' learning styles. Learning styles play an important role during this process. Gee (1990) identifies several learning styles. They include generalizing, exploratory, systematic, relationships, verbal, and visual.

Learning style inventory measurements are helpful in determining learning styles. The Canfield learning styles inventory (LSI) is one measurement instrument that determines learning styles. The Canfield LSI measures the conditions of learning, the content of learning, the mode of learning, and student expectations in a learning situation (Boylan & Kerstiens, Eds., 1989). According to Boylan & Kerstiens (ibid.), the Canfield LSI includes several specific elements associated with the four dimensions mentioned. Under the category of conditions of learning these student preferences are measured:

1. Affiliation - pleasant, friendly, and warm relations with other students or faculty;

2. Structure - orderly, logical, and well-defined goals, objectives, and study plans;

3. Achievement - independence, self-determined goals and objectives in relation to perceived skills and interests; and

4. Eminence - competition, knowledge of one's own performance in relation to other's, need for control or authority.

Under the category of Content, the instrument measures student preferences for working with various sorts of content. These content sub-categories include: numeric, qualitative, (working with words or language), inanimate (working with things), and working with people.

Canfield agrees with Gagne's notion of "Channel efficiency," the idea that in every individual, some channels of perceiving and processing information are more efficient than others (1967). As a result, his instrument also measures students' preferred mode of learning. The categories under this heading are: listening, reading, iconics (learning through illustrations, movies, slides, graphs, and pictures, etc.), and direct experience.

Finally, the Canfield LSI assesses student expectations of learning - i.e., their anticipated level of performance. The levels of anticipation include outstanding or superior performance, good or above-average performance, average or satisfactory performance, and below-average or unsatisfactory performance.

The instrument measures these categories through thirty items in which the students are asked to rank order their preferences among four choices.(pp. 15-16)

Reliability of the Canfield LSI instrument was established to be high and, in addition, validity showed "several statistically significant differences" among all pairs of groups tested (ibid.). Tamaoka (1985) generalizes that "by using Canfield's LSI, it may be possible to compare students' learning styles with teachers' instructional style." An additional instrument designed by Canfield provides an assessment of instructional style to correspond to his LSI. Brookfield (who cites Witken and Pratt in Wilson, 1991) has examined the relationship between cognitive styles and self-directed learning. Researchers have classified individual learners as Field Independent (FI) or Field Dependent (FD). FI learners are those who prefer "solitary situations and self-defined goals, strategies and reinforcement."(p. 43) FD learners are those who prefer "group situations, externally defined goals and reinforcement, and explicit instructions or definitions." (ibid.) The literature indicates that the FI learner is more likely to succeed at distance education (Wilson, 1991). Applying interactive television in a manner that provides learning opportunities for both FI and FD learners, will provide learning opportunities for both learning groups.

Identifying learner characteristics and the determination of learners' learning styles will help the instructor determine what instructional style(s) and delivery method(s) to implement. Course content can be delivered so that the students' academic success is high. Although existing research in distance education is inconclusive concerning the effect of learning style preferences on achievement, course design and assessment will play a critical role in determining what learning styles are best suited for the information and instruction delivered via interactive television technology.

Teacher Skills and Course Delivery

Distance education is a means by which learners can receive instruction that might not be available to them by traditional course delivery. DE systems that use two-way video and audio are utilized to provide the linking instructional medium to many remote learners. This interactive medium is an effective alternative to the traditional classroom setting. Learners are able to interact with the instructor and other learners at their site as well as with learners at participating remote sites. With this type of instructional delivery system, the teacher must be able to provide effective content delivery in a manner that uses the DE system such that the learner receives the maximum instructional benefits that are available.

For the novice distance teacher, familiarity with the ITV system becomes an essential requirement. Based on Thompson, Simonson & Hargrave (1992) make these recommendations for an interactive television training session:

* Provide teachers with an overview of the technology and how it works.

* Provide hands-on guided practice on the use of ITV technology.

* Incorporate the effective elements of instruction as major parts of the training session.

* Have periodic follow-up inservice and on-site coaching to ensure long term training benefits.

* Use with teachers who volunteer for ITV training.

After becoming familiar with an ITV system, teaching skills need to be adapted to fit the system. The DE teacher must provide the necessary interaction with the distance learners and present the course material in a manner that involves learners and produces learning. Seaman and Fellenz (cited in Wilson, 1991) define adult teaching as: "The activity through which the teacher or learning facilitator assists the adult student in acquiring new knowledge or skills."(p. 44)

The teacher is responsible for providing structure and feedback to the distance learners. Braucher (cited in Moore & Thompson et al, 1990) suggests that "developing a friendly atmosphere, accurately transmitting feelings by tone of voice, carefully selecting words, appropriately using silences, ... and thoughtfully integrating new students are skills which distinguish effective teachers in any setting or delivery situation."(p. 24)
Wilson (1991) identifies several skills for distance teachers from the literature: 1) imagines what the students need; 2) inspires the students; 3) encourages them; 4) likes people; 5) is alive; 6) provides feedback; 7) motivates students; 8) tolerant; 9) cooperative; 10) flexible; 11) innovative; 12) provides two-way written communication; and 13) establishes personal rapport.

Specifically, two-way interactive television (ITV) is an advanced means of providing distance education. It reflects many delivery characteristics of the traditional classroom setting. It is important to remember that there is a missing personalization with remote learners. According to Tykwinski and Poulin (cited in

Kolomeychuk & Peltz, 1991)

"The greatest challenge in interactive video instruction, or meetings, is overcoming the barriers of distance and technology that hinder that normal personal interaction. This interaction may be negatively affected by the novelty or fear of technology, number of participants or students and/or sites included in an event, decreased ability to receive non-verbal cues from participants, limited opportunity for after-meeting or after-class discussions, and preconceived notions about television viewing (e.g., a passive activity).

A high level of interaction is important in teaching and learning and in meetings in order to increase the attention and motivation levels. Interaction can also be used to determine whether the information and concepts being presented are properly received and interpreted. It is recommended that leaders, participants, instructors, and students become confident (through exposure and training) using the technology, limit the number of participants/sites, evaluate course and instructional design, establish interpersonal rapport, find activities that promote involvement, and establish new questioning strategies to promote interaction with the audiences."(p. 7)

The Office of Technology Assessment (1989, p. 93) states that "unless distance learning teachers pay close attention to the need to create an interactive environment appropriate to the technology, students can and will tune out." Johnstone (cited in ibid.) suggests:

"The best way to learn new information is to receive it while in an active, rather than passive, state of consciousness....One simple method the instructor can use to assist the learner...is to do something that is never done on broadcast television: to talk directly to the distant learner and require a response at the very beginning of the session." (p. 93)

The Alaska University (1989c) suggests the consideration of these strategies for teaching at a distance:

* Adapt instruction to meet the varied needs of the students, the content, and the limitations of the delivery system.

* Hold a pre-course audio (or ITV) conference to increase student familiarity and comfort with the system.

* Familiarize students with each other and with the instructor: develop/distribute student and instructor biographical sketches, make on-air introductions, have students state their names and locations when they address the group.

* Visit the different sites during the course , meeting individually with students.

* Maintain phone-in office hours so students can call collect.

* Develop skills to facilitate students' learning on their own and in concert with other students at a distance.

* Work together to minimize and rectify technological problems.(p. 3)

Other strategies include: a welcome letter, a clearly written and complete syllabus, course materials in student hands on time, quick return of student work, and a willing and obvious desire to meet student needs.(Alaska, 1990b, p. 4) Additionally, the Learn Alaska Network (cited in Office of Technology Assessment, 1989) identifies distance teachers' needs for assistance is such areas as:

* the amount of time needed to prepare and teach distance delivered courses,

* methods to establish and maintain effective communication with distant students,

* experiences with other faculty members,

* strategies for adding visual components to audio courses,

* planning and management of organizational details involved in distance delivery, and

* strategies to encourage group cohesion and student motivation.

Communication between teacher and student is important. There are several channels that can be used to communicate with the learners located at a distance. They include the telephone, the mail or postal system, computer messaging systems (bulletin boards and the like), and in the case of an ITV delivery system, the class meeting itself. The use of computers to supplement the communication between teacher and learner has distinct advantages. The use of such systems allows the students to move at their own pace and receive feedback from the teacher in a timely fashion.

Holmberg (1990) states:

"The possibility to use micro-computers, modems and telephone communication, so-called electronic mail, to attain immediate reception both of students' assignment papers etc. and of tutors' correction and comments will undoubtedly bring about considerable improvement..."(p. 16).

Computer-mediated communication (CMC) has the potential to favorably affect the course quality, attitudes, and motivational levels of students. The convenience of CMC enhances distance education effectiveness and provides flexibility and other advantages in the teacher-student and student-student communication processes (Boston, 1992).

Communication between teacher and student must occur in a manner that encourages personalization, motivation, and understanding. Effective DE instructional delivery needs as much personalization as is necessary to provide the distance learner with every possible opportunity to learn and feel comfortable with

the DE technology. Existing research provides a list of guidelines for personalizing the ITV classroom. ITV teachers should:

* Emphasize and encourage active student participation.

* Meet face-to-face (if at all possible) with remote site groups prior to the first scheduled class.

* Schedule formal and informal face-to-face meetings with the class during the course term.

* Teach to the camera. This gives the remote student the impression of eye contact which is critical to personalization.

* Travel to, and teach from, each remote site if possible.

* Devise formative evaluation techniques in order to assess the success of the class as it is being taught. (Thompson, Simonson and Hargrave, 1992, p. 42)

The literature and existing research on teacher skills and course delivery includes an extensive amount of information on instructional delivery. Personalizing course delivery is seen as an essential need in the distance learning environment. Additional communication channels are important to providing for the distance learners' needs. Familiarity with the ITV system is important for both the distance teacher and learner. To ensure that course delivery is as effective as possible, teachers need to evaluate and assess course delivery.

Course Assessment

Course assessment must not be overlooked during the course design and planning stage. It is addressed here and uses the framework provided in previous sections. A primary purpose of course assessment is to determine if goals and objectives that have been set for the course have been achieved. This will help determine if the instructional methods chosen, and selected instructional media and materials are providing the means necessary to achieve such goals and objectives.

Assessment strategy will include formative and summative evaluation development. Formative evaluation will provide an on-going evaluation process that originates from the development of course materials and content delivery. Determination of problem areas within course materials and content delivery will indicate revision strategies that need to be implemented. Such strategies will ultimately increase the effectiveness of course materials and content delivery. Revisions that take place during the formative evaluation process can be implemented prior to course completion.

Summative evaluation will occur at the conclusion of the course. It will provide data on the effectiveness of the course and may include data collected during formative evaluations. Data gathered through the summative evaluation process will help in planning future courses. Summative evaluation will often include pre-testing, post-testing, and the gathering of other information that is obtained from tests and

questionnaires. Other information can also be collected that provides information such as personal profiles of participating students.

The development of a course assessment strategy is the key to determining what changes need to be made to increase course effectiveness and efficiency. The Alaska University (1989b) suggest considering the evaluation of the following:

* Audience attitude and performance.

* Strengths and weaknesses of program.

* Effectiveness of teaching techniques and delivery systems.

* Instructor effectiveness.

* Degree to which course objectives were met.(p. 6)

Particular instruments can be developed and administered to distant and home site learners. Pre-test and post-test instruments will obviously determine if instructional delivery was effective in producing the desired learning outcomes and will be important to the summative evaluation process.

Questionnaires and tests can be developed to perform both formative and summative evaluation. It is important to remember that evaluation instruments have already been developed. Check to see if questions can be applied to the particulars of the course to evaluate.

Biner (1993) provides a four-step process for the development of an instrument to measure student attitudes toward televised courses. The steps include:

1 - Generating items related to course satisfaction.
    a. Instruction/Instructor Aspects
    b. Technological Aspects
    c. Course Management/Coordination Aspects

2 - Defining dimensions underlying items.

3 - Selecting content valid items.

4 - Writing and pre-testing the instrument.

Harrison et al (1991) determined that the three most consistently mentioned components of distance education programs were instruction, management, and logistics. Example elements associated with each of these components include:

Instruction

    * instructional strategies such as the pacing of instruction, the use of work-related examples, the formation of study or support groups

* effectiveness of instructional materials

* the methods used for providing feedback, counseling, or motivation of learners

Management

* organizational structure

* communications between the program and clients, instructors, or students

* how available resources are used

* the policies and procedures of the distance education program.

Logistics

* the quality of the video

* the on-time delivery of instructional programs

* an efficient method of providing off-air, course-related materials

* the instructional environment at the receiving site(s)

Such elements can be included in the assessment instruments used in formative and summative evaluations. Appendix E contains several sample evaluation instruments that can be utilized to perform evaluations. Because assessment is so important in providing information needed to determine revision needs, such instruments should be developed during the course design and planning stage of the systematic planning process to ensure that assessment is effective and implemented on a timely schedule.

An Instructional Design Model for Distance Education Via ITV

Based on the literature and our own experience with distance education via interactive television, we suggest the following nine step model for designers of college level distance education courses:

1. Identify Course Goals
2. Analyze and Organize Content
3. Write Performance Objectives
4. Identify Learner Characteristics
5. Develop Lesson Plans
6. Develop and Select Instructional Materials
7. Design and Conduct Formative Evaluation
8. Modify Instructional Plan
9. Design and Conduct Summative Evaluation

This model is an adaptation of the Dick and Carey model discussed previously and is based on the unique characteristics of distance learning via ITV, and our own research. We think that it is well suited to the delivery of graduate level curses and takes into consideration the mature learner. This model has evolved through experience. It has been used successfully at Texas Tech for several years and we therefore offer it for your consideration. The model is implemented as follows:

To be practical in terms of planning and development time and cost effectiveness, distance education courses must be planned and conducted with resources similar to what is afforded traditional campus-based courses. First, a planning team should be established. Members of planning teams frequently include content experts, instructional designers, video production experts, graphic artists, media specialists, and others. However, as a practical matter, limited college and university budgets and resources usually limit the membership of the planning team. We suggest that planning team consisting of the teacher, an instructional technologist, and a student or potential student of the course. It is also possible that an experienced ITV teacher may constitute the entire planning team.

1. Identify Instructional Goals.

Goals are the broad statements of expected outcomes for the course. Identification of the instructional goals are primarily the responsibility of the course instructor. If the course is designed to meet a specific purpose (eg. certification or degree requirements) the basic content of the course may be predetermined. The goal statements will therefore reflect this. Usually, courses taught via ITV are also taught in traditional campus classrooms. The goals of the ITV course should be basically the same as campus-based courses. We have offered an introductory course in computer applications for educators both on campus and via ITV. Some sample goals for this course are as follows:

> 1. Demonstrate an understanding of basic computer terminology, hardware and software both as a classroom and personal productivity tool.
>
> 2. Evaluate, select and recommend educational software and prepare appropriate instructional design in order to integrate the use of small computers into specific content areas.
>
> 3. Explore developmental issues related to the creation of appropriate instructional software.

These goals appear on the course syllabus for both the regular on-campus classes and ITV classes.

2. Conduct Content Analysis

The teacher is a content specialist and therefore will be knowledgeable concerning the content of the course. Texts, accreditation association guidelines, and state curriculum guides may also be helpful. We divide the course into logical segments representing one class each and begin to develop a lesson plan for each class. The topics and content outline for each class are specified first. The instructional time

for any college course must meet the minimum requirements of the college/university and the accreditation agency, usually 35-40 hrs each. However, allocation of class time may be different for ITV course than for on-campus courses. Some courses will require guided practice at remote sites, which are not part of televised lessons. This may be scheduled as a laboratory or may be conducted as part of regular instructional time.

3. Write Performance Objectives

Measurable objectives are written for each lesson. These are taken from the goal statements and are stated in terms of observable student behaviors. Measurable objectives help clarify exactly what is expected in the minds of both the teachers and the learners. Techniques of stating performance objectives are beyond the scope of this paper. A sample set of objectives for a lesson on integrated software for our educational computing course follows is given here as a sample:

Topic: Introduction to Integrated Software
Objectives:
Students will be able to:
1. Define integrated software.
2. List several examples of integrated software packages.
3. List examples of computer applications which are frequently included in integrated software.
4. List examples of products which may be produced with integrated software.
5. Discuss the relative advantages and limitations of integrated software packages as compared with stand-alone software.

If the teacher is not an instructional designer, the technologist should assist the course instructor in stating performance objectives for each class. The student member of the planning team can be asked to review the evolving lesson plans for suggestions. Clarity of goals and objective statements, terminology used, and suggestions on content to be included can be reviewed.

4. Identify Learner Characteristics

There are many ways to identify learner characteristics. We gather information at the first class meeting. This begins with introductions and completion of a brief student profile form. This includes such information as student's major course of study, reason for taking the course, previous experience relevant to the course, and place of employment. We also use both the Canfield Learning Styles Inventory and a teacher-made pre-test which is given at the first class meeting. The Canfield, which was discussed earlier, provides information on how the student learns best and suggests the kinds of activities which may be helpful to him or her. The pre-test provides information about how much the student already knows about the course goals and objectives. Since we deal with mature learners, we often ask for self-assessment. The information from these instruments is promptly sent to the instructor by FAX or data communications. The data is analyzed and detail is added to the lesson plans based on the information. For example, if most of the students are found to be field-independent learners, more activities which provide for independent study are included in the course. Student profile cards are also made which are referred to by the instructor as the course progresses. We use

there to try to make assignments relevant to the student's interests, level of knowledge, and learning style.

5. Develop Lesson Plans

The basic instructional plan is the syllabus which is prepared first. However, the details of the instructional plan are contained in the lesson plans. The framework of each lesson plan was established in the content analysis and writing of performance objectives for each lesson. Now it is time to add detail to each lesson. With knowledge of the learners, the objectives and topics can be adjusted. Relevant examples can be developed. Activities can be planned. Requirements for media and materials can be determined. The technologist works with the teacher to plan activities which work best with the ITV medium. Lesson plans will be fully developed as the course is conducted. However, it is important to have long range plans. In addition to the basic need for good planning, the ITV staff will need to know what to expect and production of materials must be done in advance. We try to have final plans ready at least two weeks in advance of each class.

6. Develop and Select Instructional Materials

Earlier it was pointed out that ITV is an inherently visual medium. If a traditional lecture is poor technique in a regular class, it is deadly on ITV. Visuals, video demonstrations, and commercial media can be used to present the content in a manner which is more likely to maintain the students attention and help them understand and retain the information. Specifications for the media are developed in the instructional plan. Frequently, the teacher produces the media or the campus media service, ITV staff, or students may help.

7. Design and Conduct Formative Evaluation

As the course progresses, frequent feedback is obtained both informally and formally. Question and answer sessions are held during each class. Brief quizzes are given and student assignments are collected regularly. We specifically try to determine which methods and materials are preferred and to what degree objectives are being mastered.

8. Modify Instructional Plan

Modifications to the lesson plans are made as the course progresses based on feedback from the students. The student member of the planning team is also frequently used as a sounding board and to make suggestions. Material that was not mastered may be clarified by presenting it in another manner. Sometimes, new timely topics are added.

9. Design and Conduct Summative Evaluation

At the conclusion of the course, a post-test and a course evaluation are administered. The post-test is either the same as the pre-test or a more detailed version of it and provides detailed information concerning how well each objective

was mastered. The course evaluation that we use is a standard course evaluation used at Texas Tech to which we have added several items concerning delivery of the course via ITV. This information is useful in evaluating the success of the course and for providing information for the next time the course is offered. The course planning team reviews and evaluates the data and makes recommendations for future courses.

Summary

Distance education delivery via ITV is clearly an effective means of providing instruction to learners at a distance. Interaction among course participants can vary over a wide range because of the capabilities of this delivery system. As a result, it is important for educators who use this technology for delivering instruction to know how to use the system, understand its capabilities, and know how to apply those capabilities to enhance instructional delivery. This in turn will provide the best possible learning outcomes for participating learners.

ITV technology provides many advantages as an instructional delivery system. Advantages, such as the ability to provide immediate feedback to learners and have interactive personal participation among all sites, enable this delivery format to be highly effective. Additionally, students benefit from this format by experiencing similar learning and achievement levels of students who receive instruction through the traditional classroom setting.

Other advantages of ITV that play an important role in providing effectiveness include the visual capabilities of the system, open-line audio transmission, and the sharing of many resources including master teachers.

Research indicates that instruction delivered via ITV requires structured planning and development. The use of instructional design principles to achieve effectiveness in course planning and instructional delivery is imperative. There are many instructional design models that can help the course designer accomplish the planning and development of DE courses. Although no one specific model has been determined to be the most effective in aiding the course designer, the use of such models has proven to be effective in producing interactive television instructional delivery effectiveness.

Course planning for ITV delivery requires the designer to know the characteristics associated with distance education systems, the available resources, how course content is to be delivered, and learner characteristics and learning styles. Planning teams can be utilized and the number of participants can vary from one to many.

Studies show that DE teachers are concerned with selecting course content and materials, covering the course content, class process, on-going planning activities, student participation, teacher-student communication, and student characteristics.

McGreal's (1991) guidelines to help the ordinary teacher produce instructional materials for distance education systems are helpful and are similar to those found in the literature. Also, Parker and Monson (cited in Moore & Thompson et al, 1990) reveal techniques important to course development that include humanizing,

participation, message style and feedback. Interactive study guides are course materials that can also be developed to accommodate the ITV medium.

Specifically targeting conditions that will help students learn in the DE setting is important. Teaching methods and models will prove effective with the ITV medium. Knowing the characteristics and learning styles of the learners will help increase the effectiveness of the instruction development and delivery processes. Including delivery strategies that accommodate for both FI and FD learners will provide for a wider range of learners.

Existing research and literature provide these recommendations for training teachers about ITV:

* Provide teachers with an overview of the technology and how it works.

* Provide hands-on guided practice on the use of ITV technology.

* Incorporate the effective elements of instruction as major parts of the training session.

* Have periodic follow-up inservice and on-site coaching to ensure long term training benefits.

* Use with teachers who volunteer for ITV training. (Thompson, Simonson and Hargrave, 1992, p. 42)

* Establish the amount of time needed to prepare and teach distance delivered courses.

* Develop methods to establish and maintain effective communication with distant students.

* Provide experiences with other faculty members.

* Incorporate strategies for adding visual components to audio courses.
* Plan and manage of organizational details involved in distance delivery.

* Use strategies to encourage group cohesion and student motivation.

In delivering instruction through the ITV medium, existing research and literature provide effective teaching strategies and guidelines for personalizing the ITV classroom. Teachers should:

* Adapt instruction to meet the varied needs of the students, the content, and the limitations of the delivery system.

* Hold a pre-course audio (or ITV) conference to increase student familiarity and comfort with the system.

* Familiarize students with each other and with the instructor: develop/distribute student and instructor biographical sketches, make on-air

introductions, have students state their names and locations when they address the group.

* Maintain phone-in office hours so students can call collect.

* Develop skills to facilitate students' learning on their own and in concert with other students at a distance.

* Work with students to minimize and rectify technological problems.(p. 3)

* Emphasize and encourage active student participation.

* Teach to the camera. This gives the remote student the impression of eye contact which is critical to personalization.

* Travel to, and teach from, each remote site if possible.

* Devise formative evaluation techniques in order to assess the success of the class as it is being taught. (Thompson, Simonson and Hargrave, 1992, p. 42)

DE taught via ITV can be effective and rewarding. Proper course design, development, implementation, and evaluation will ensure that the DE learner receives the maximum benefits from the delivery medium. The research and literature provide information to help the DE teacher to understand DE technology and systems, and plan and deliver effective instruction. As a result, learning opportunities for DE learners will continue to improve as new strategies and advancement in technology enhance the delivery of instruction via ITV.

REFERENCES may be found in Appendix E